Progress Update on Maryland Electric Vehicle Infrastructure Study

Presentation to the
Electric Vehicle Infrastructure Council
May 22, 2012

PARSONS BRINCKERHOFF

Presentation Outline

- Research Findings
- Existing PEV Owner Demographics
- Preliminary Findings (draft)
- Next Steps

Research Findings - Georgetown Climate Center

- Maryland is one of twelve members of the Northeast Electric Vehicle Network focused on:
  - Economic Growth
  - Clean Energy
  - Reduction of greenhouse gas emissions stemming from use of traditional oil based fuels

Research Findings - Georgetown Climate Center

TRANSPORTATION & CLIMATE INITIATIVE
Of the Northeast and Mid-Atlantic States

- GCC working with New York State and Clean Cities Coalitions throughout the northeast region to engage, local, regional and national stakeholders to plan for PEV readiness
  - Model building codes
  - Model permits and zoning
  - Regional outreach and communication

Research Findings – State Initiatives

- More than 15 US States have State sponsored and/or coordinated EV and Alternative Fuel Vehicle (AFV) efforts
- More than half of the States provide HOV lane use for PEVs and AFVs no matter the number of vehicle occupants
- Conversion of State vehicle fleets to AFVs and clean emissions vehicles is the most prevalent initiative
- Tax incentives vary from rebates for purchase of PEVs and related infrastructure, to reduction or exemption of personal property tax or sales and use tax as well as rebates, grants and loans for alternative fuels.

Research Findings – State Initiatives

- Arizona requires AFV license plates on AFVs used to identify an AFV for HOV Lane Use, parking incentives in car-pool spots and PEV only mandated parking at charging stations
- In California Farmers Insurance offers a 10% AFV discount, LA, Sacramento and Southern California electric providers are offering reduced rates for PEV charging, and California offers AFV financial incentives for:
  - Commercial AFV demonstration and deployment projects
  - Research, development & production of alternate & renewable fuels
  - Manufacturing of AFVs, workforce training, and state rebates for PHEVs and ZEVs

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Research Findings – State Initiatives

- Virginia provides tax credits to AFV related manufacturing businesses for new job creation, exempts HEV's with greater than 50 mpg from emissions testing, and allows for personal property tax reductions on AFVs
- Washington State offers tax exemptions for public lands used for EV Infrastructure, exemption from state tax on services related to EV batteries, is partnering to fund the installation of EVSE along I-5 and US-2 corridors (electric highway) and mandates free charging at state office building for the state fleet vehicles, parties doing business with the state and general commuters

WEST COAST ELECTRIC HIGHWAY

Research Findings

Public EV Chargers

- DC Fast Chargers provide most PEVs up to 50 percent battery capacity charge in under 10 – 15 minutes
  - Currently CHAdeMO available for Nissan & Mitsubishi vehicles
  - Late 2012 early 2013 standard DC Fast Charger available for Audi, BMW, Chrysler, Daimler, Ford, General Motors, Porsche and Volkswagen vehicles
- Level 2 chargers currently can be used by all plug-in electric vehicles to "top off" or get a slower/full charge over four to eight hours
- Level 1 chargers are best for smaller battery PHEVs and long term parking situations – workday parking, airport or other extended stay parking conditions

Research Findings - Through/Visitor Trip

Extended Travel Distances Site Selection Criteria

- DC Fast Chargers or Level 2 chargers located every 40 to 60 miles to dispel driver “range anxiety”
- Charging locations with easy access to the highway (I-5 Corridor in Oregon, chargers are located within one-half mile of highway interchanges).
- Charging locations should have the following amenities:
  - Safe, convenient access;
  - Restrooms and drinking water;
  - Available, long-term parking spaces;
  - Shelter and lighting; and
  - Other customer amenities (e.g., shopping, coffee, activities)

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Research Findings - Through/Visitor Trip

EV Infrastructure Innovation US and Abroad

- **GOe3 Charger Network**

  Establishing network of 500 Level 2 & 3 chargers along US interstates – route for first 50 debuted Earth Day 2012

- **Better Place Model**

  Israel utilizing Better Place battery lease and swap model

- **Rest & Recharge**

  Rapid charging along Canadian highways with portable display device to indicated charge level and cost

PEV Ownership Demographics

- Income - $100K and higher
- Education – College and/or advanced degrees
- Homes with Garages
- Existing PEV Owners in Maryland – 289 (as of 4/23/12) highest ownership in:
  - Montgomery County – 114
  - Anne Arundel County – 41
  - Baltimore County – 29
  - Prince George's County – 22
  - Howard County - 20
  - Baltimore City - 19

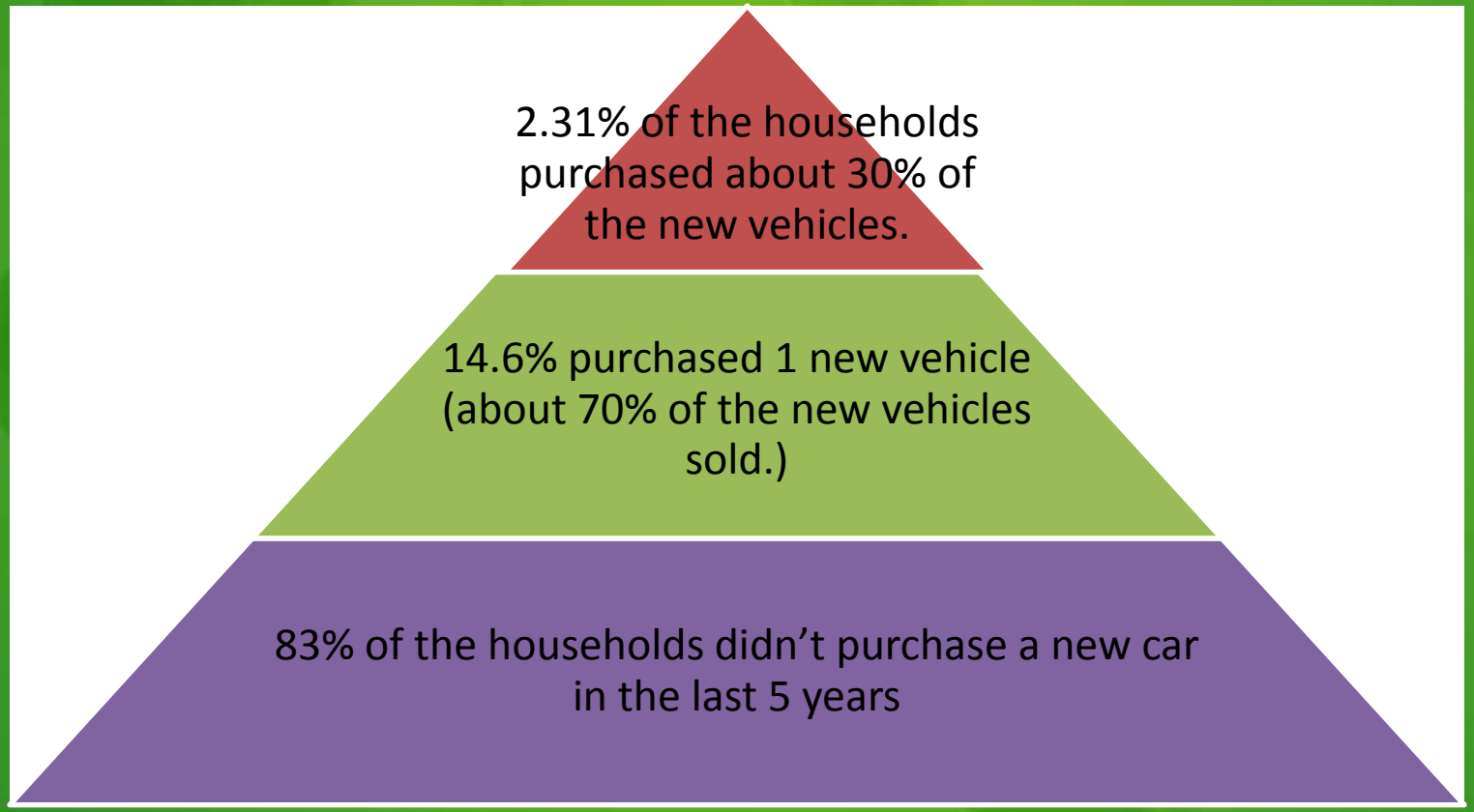
PEV Ownership Demographics

Location Analysis of the Potential Demand for Plug-in Vehicles

PEV Ownership Demographics

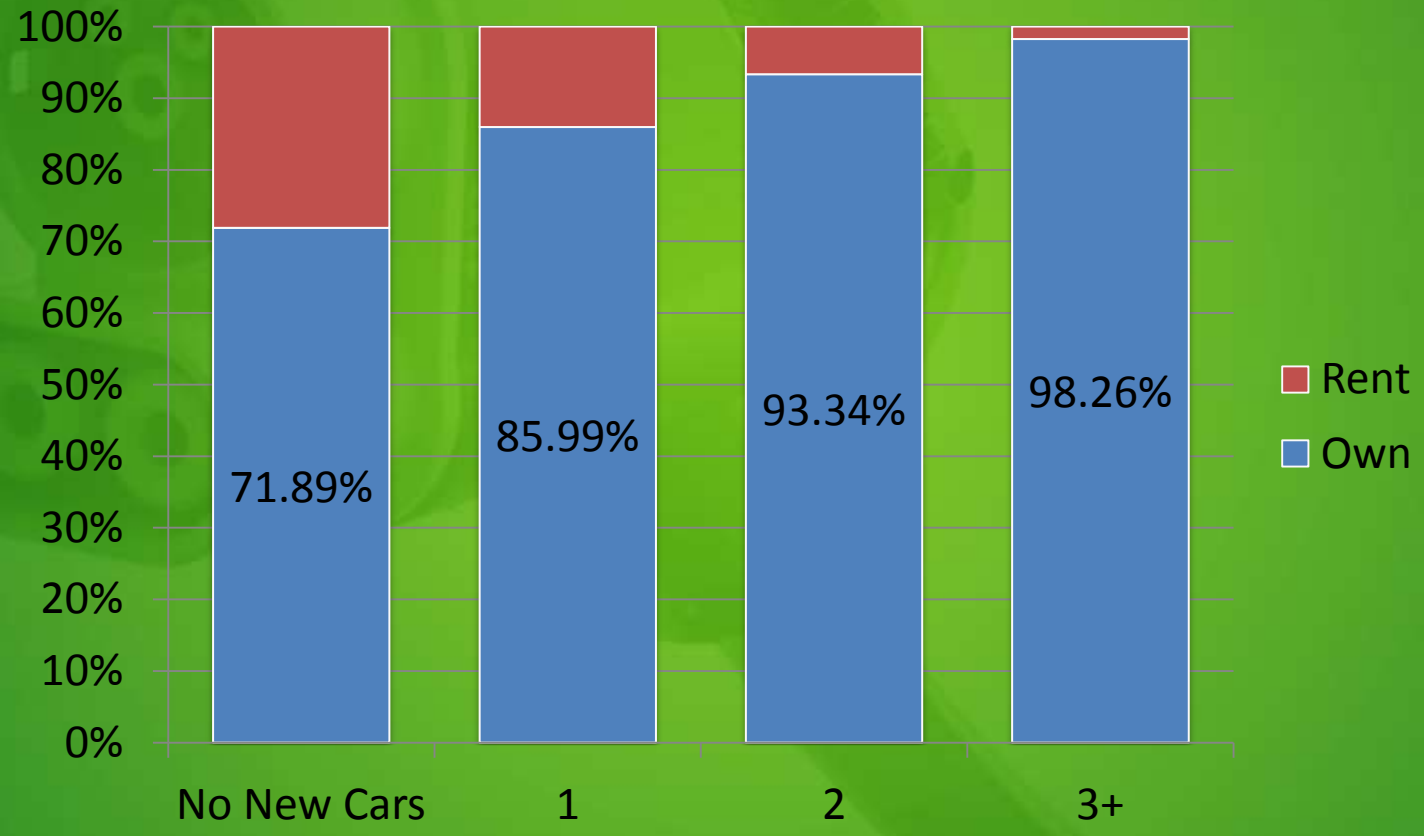
New Car Buyers in Maryland Area

(NHTS data N=17152 Households for MD,DC,DE,PA,VA,WV)



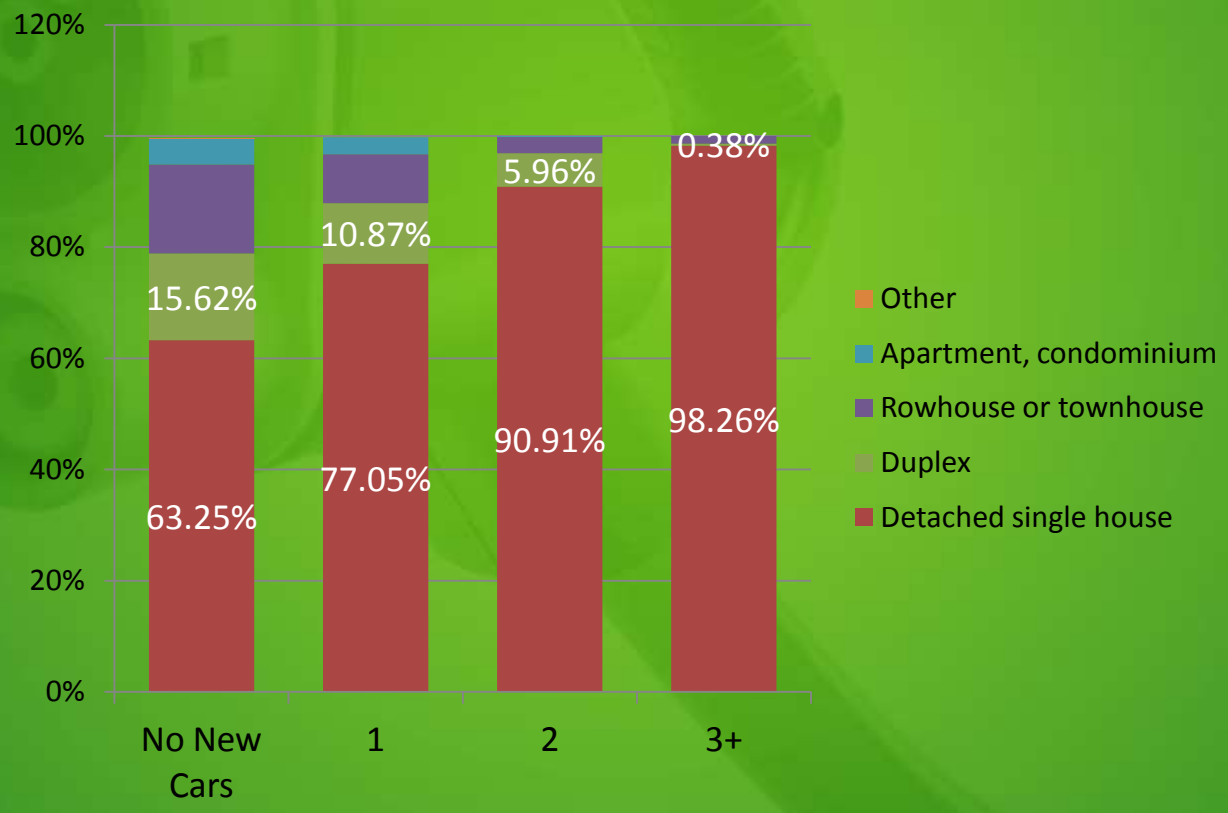
PEV Ownership Demographics

New Car Buyers - Own or Rent?



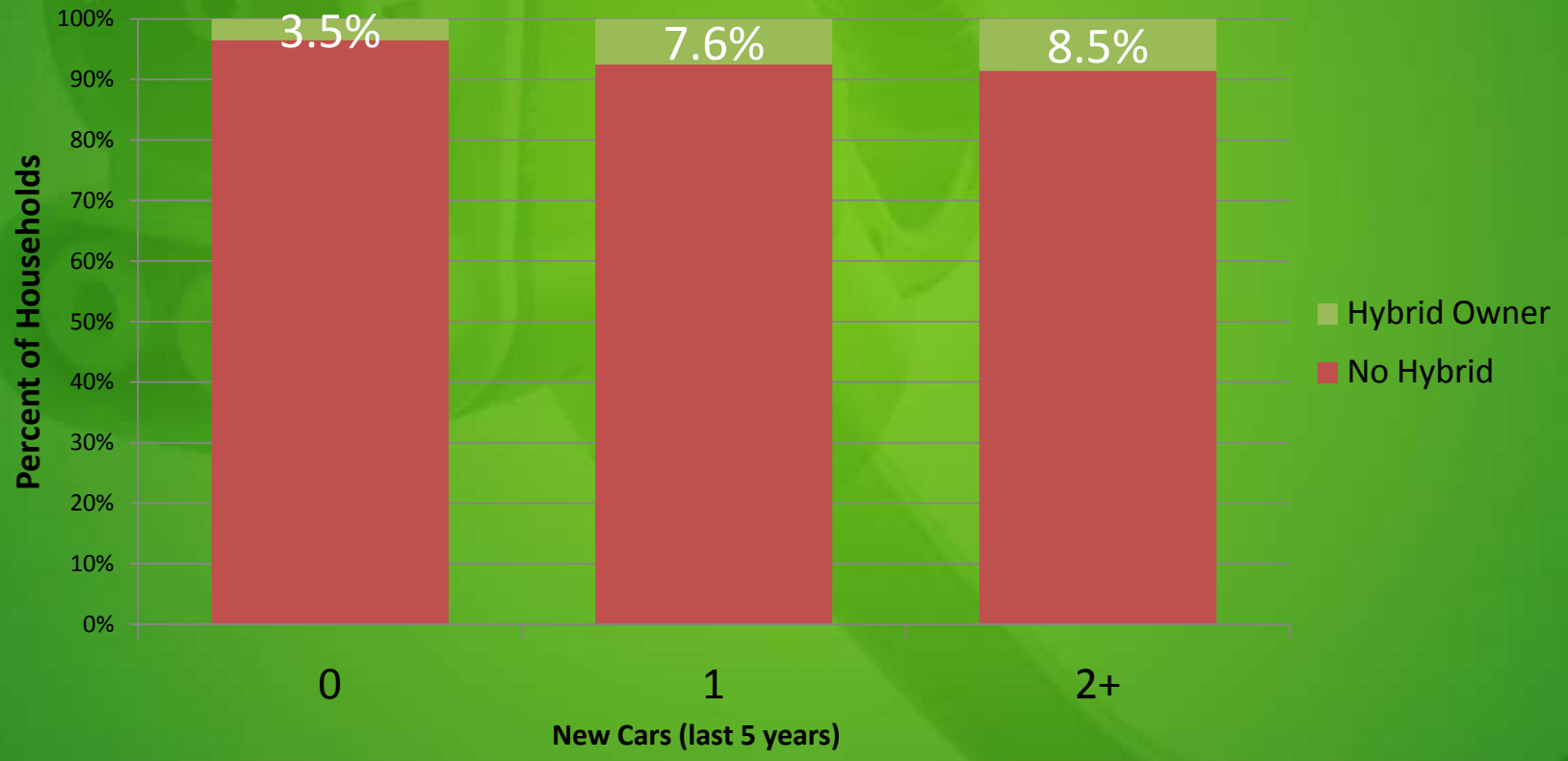
PEV Ownership Demographics

New Car Buyers' Housing Type



PEV Ownership Demographics

New Car Buyers and Hybrid



PEV Ownership Demographics

New Car Buyer Income

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PEV Ownership Demographics

PEV Buyers in California (N=1201)

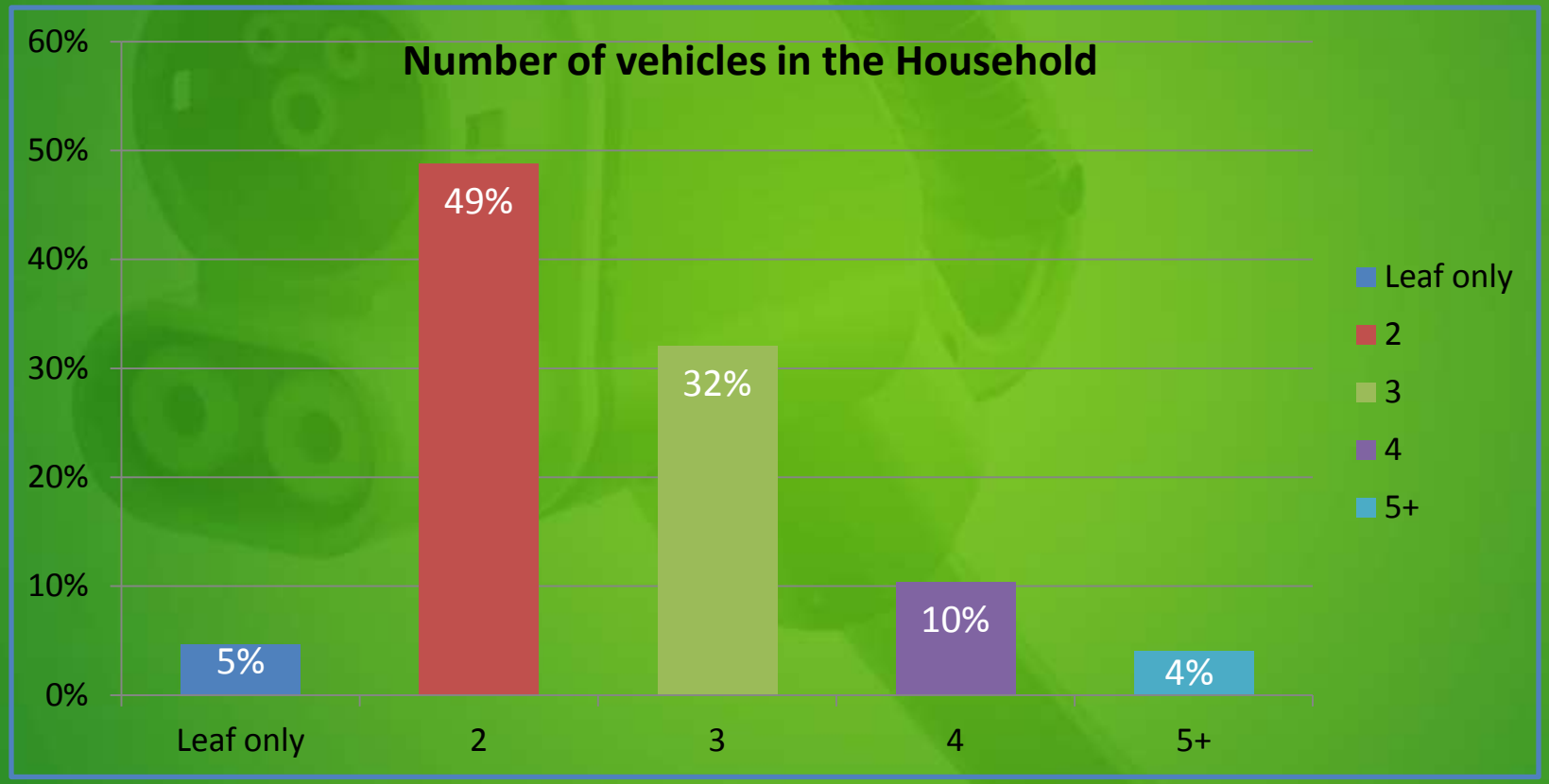
- 96% live in single family House

- 96% own their house
  - 1% rent in SD
  - 5% rent in other areas

- 36% have solar panels
  - 18% consider installation
  - 40% have no plan to install
- Average Household size 2.7
- 83% have yearly income income higher than $100K
  - 46% incomes is higher than $150K
  - 16% decline to state.

PEV Ownership Demographics

PEV Buyers in California



- 23.8% of the EV households also own a hybrid.

N=1115

PEV Future Considerations

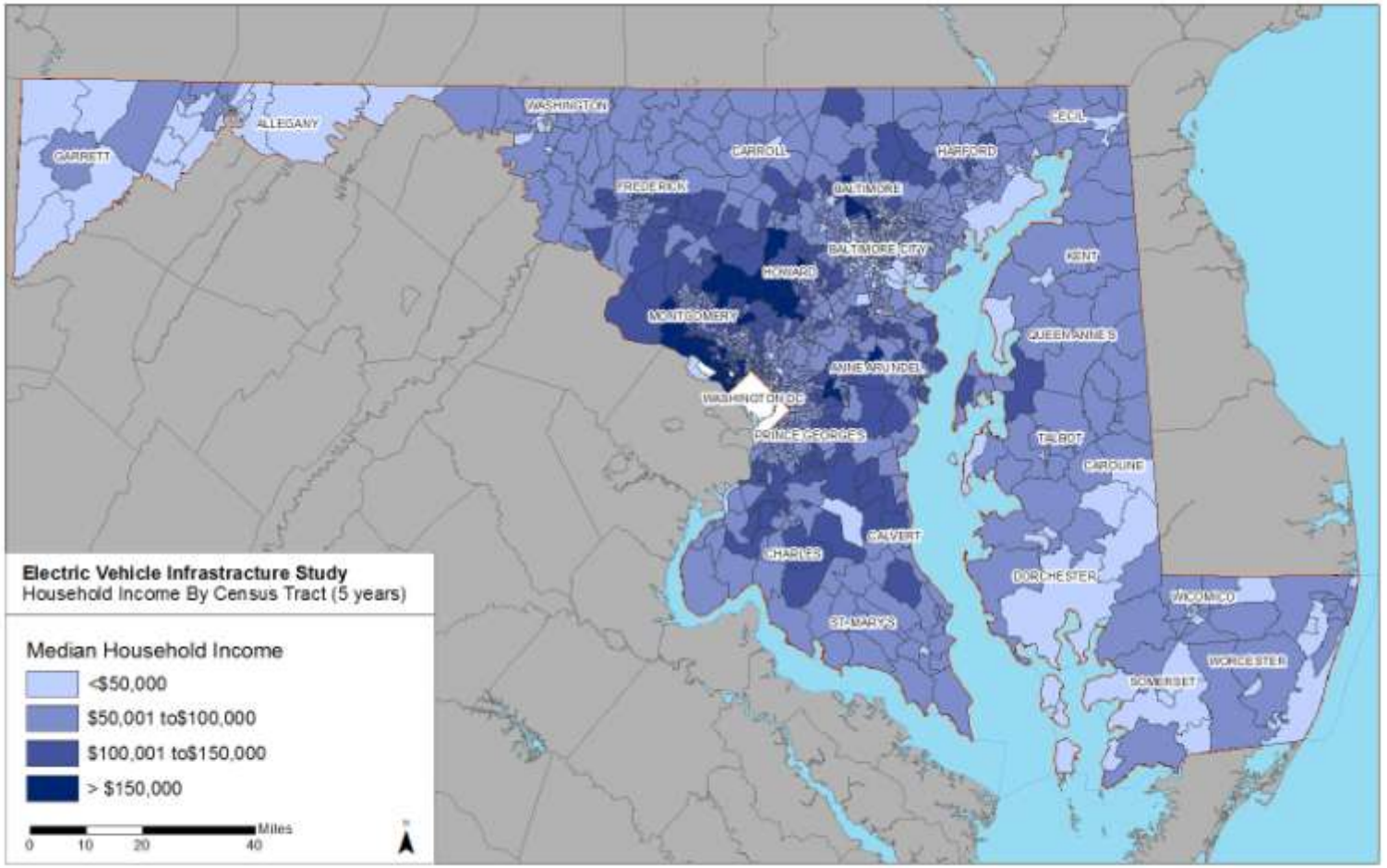
How many vehicles will require EV charging?

- President Obama has set a goal of 1 million electric cars on the roads in the US by 2015

Main factor are Gas price and Battery price

- With Gas price of about $4 per Gallon and electricity price of 12c per Kw/H electric driving can save about 8-12 cents per mile or about $800 - $1500 per year
- With battery price of about $600-$700 per Kw/H, electric vehicle cost between $8000 - $20,000 more than regular gasoline car.
- Over time we expect Battery price to drop to $300-$500 range, gas price may also fluctuate

PEV Ownership Demographics – Income Level



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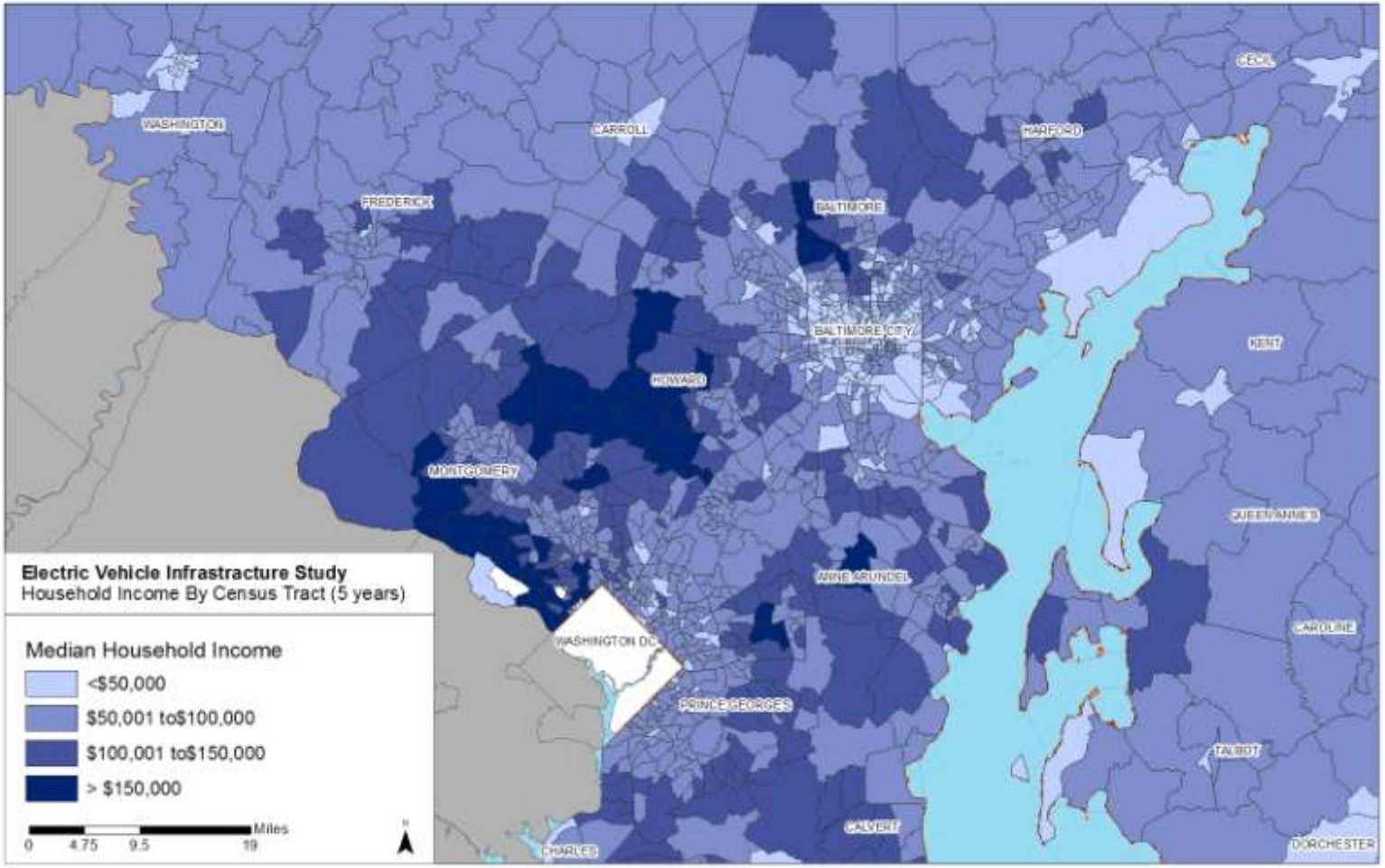

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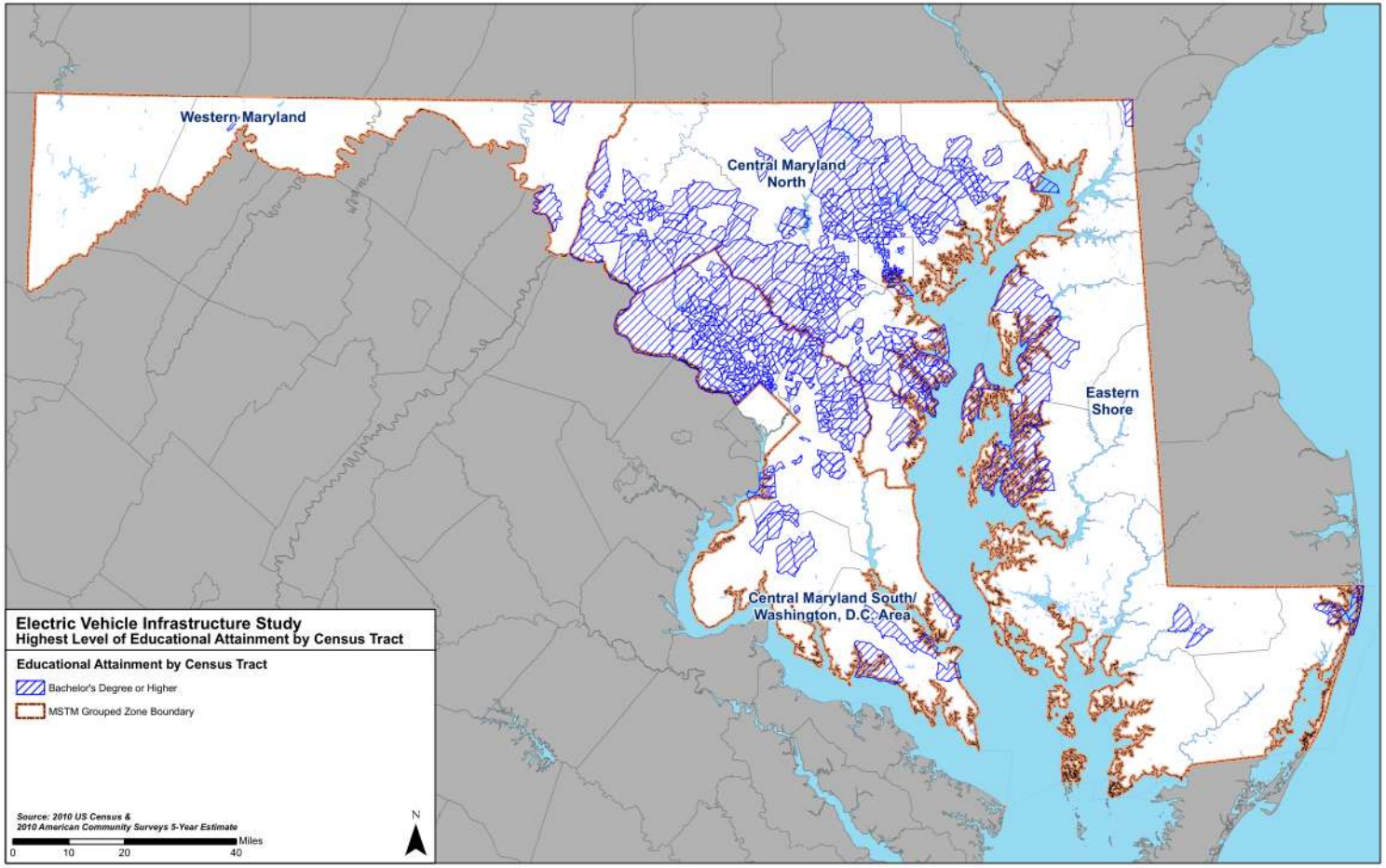
PEV Ownership Demographics – Education Level



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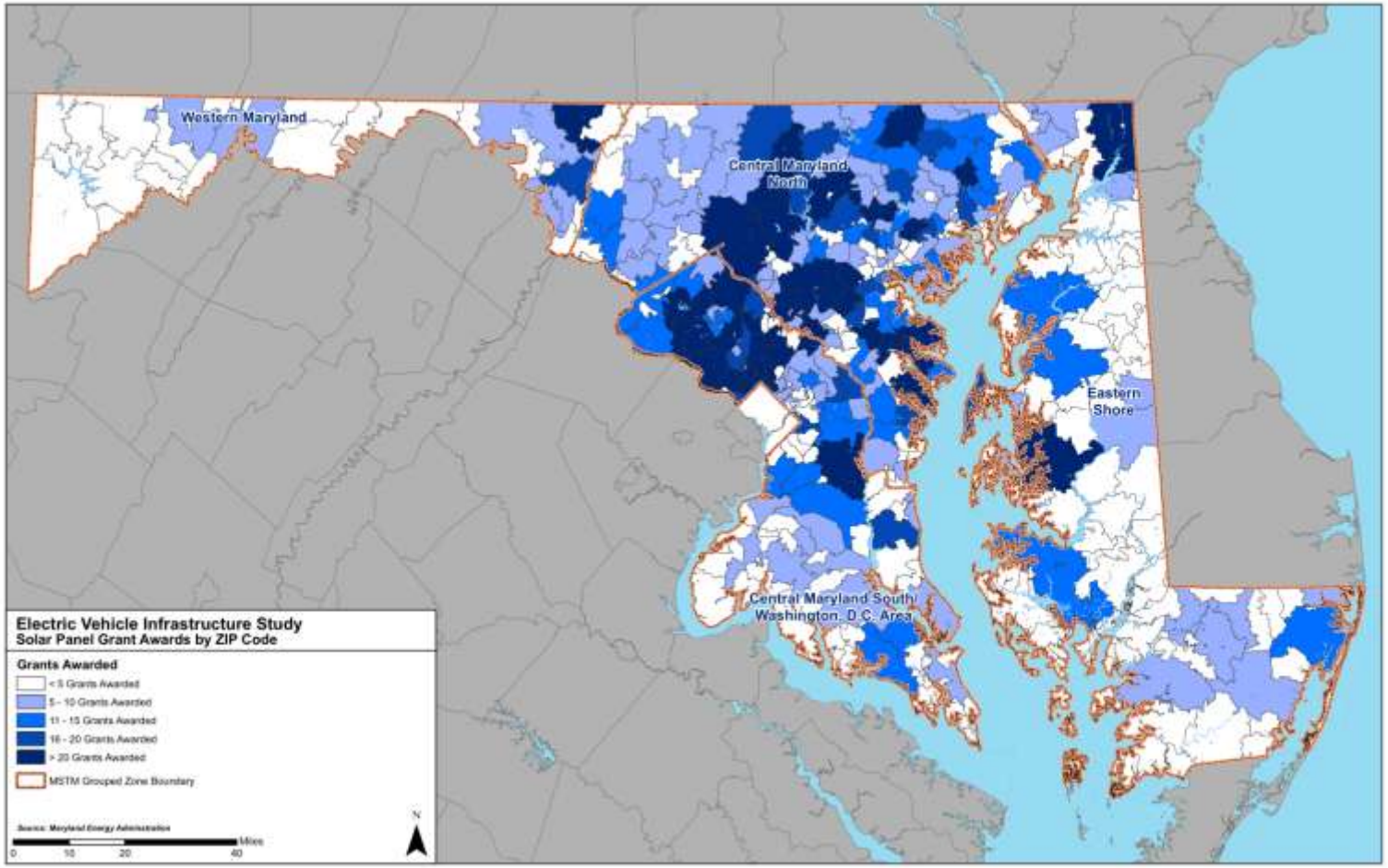
PEV Ownership Demographics – Solar Power in Use



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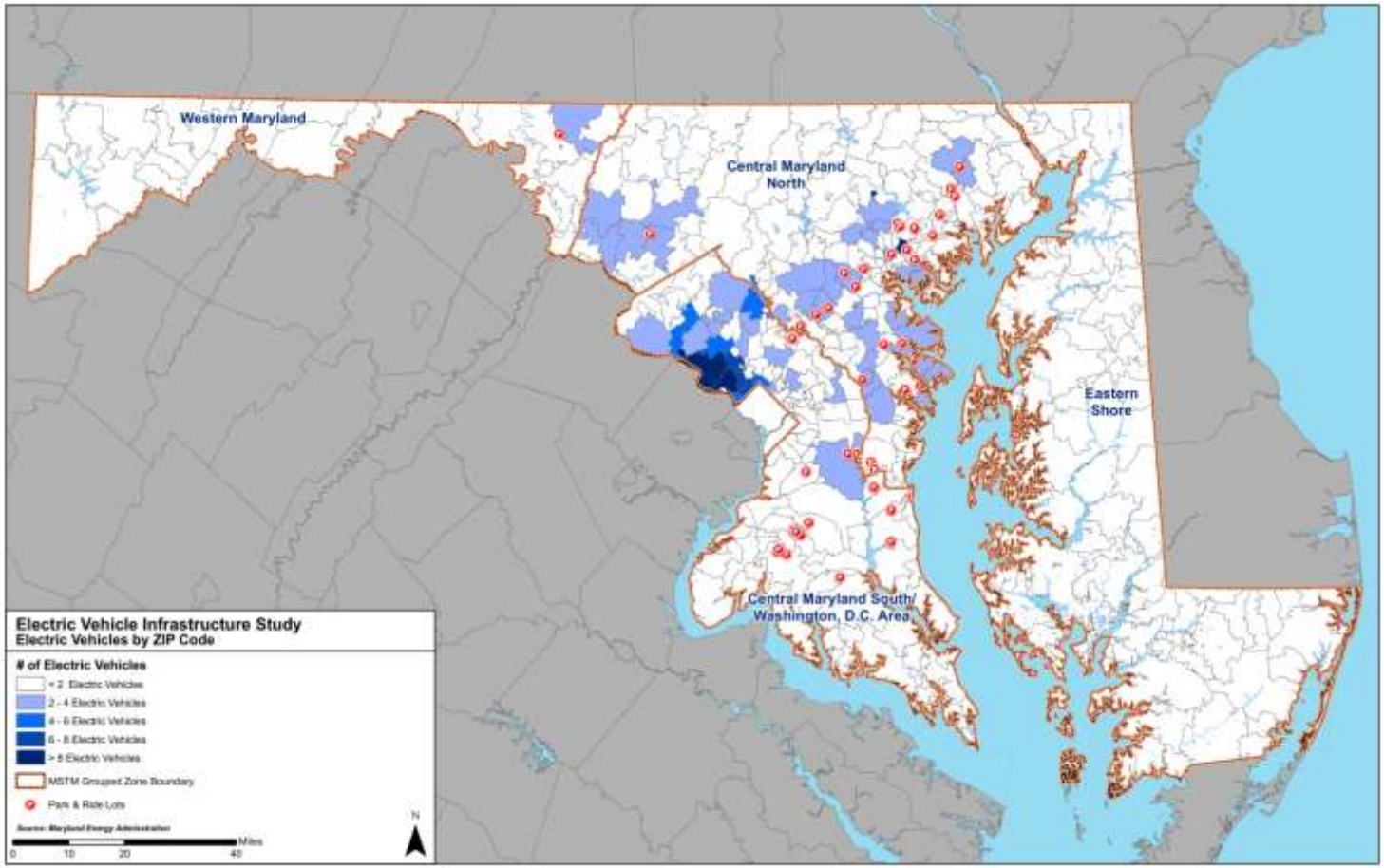
PEV Ownership Demographics – Existing PEV Owners



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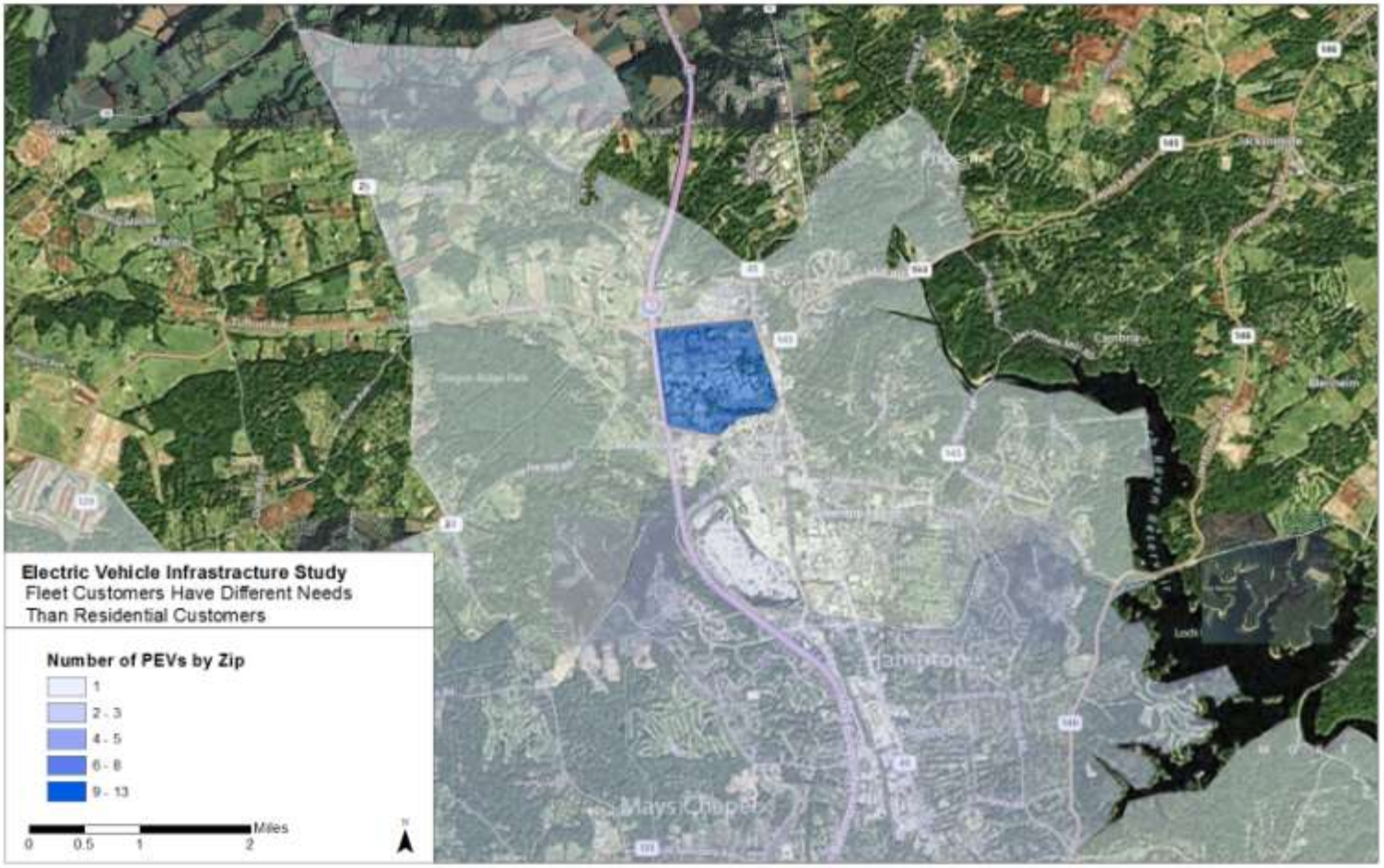
PEV Ownership Demographics – Some Owners are Fleets



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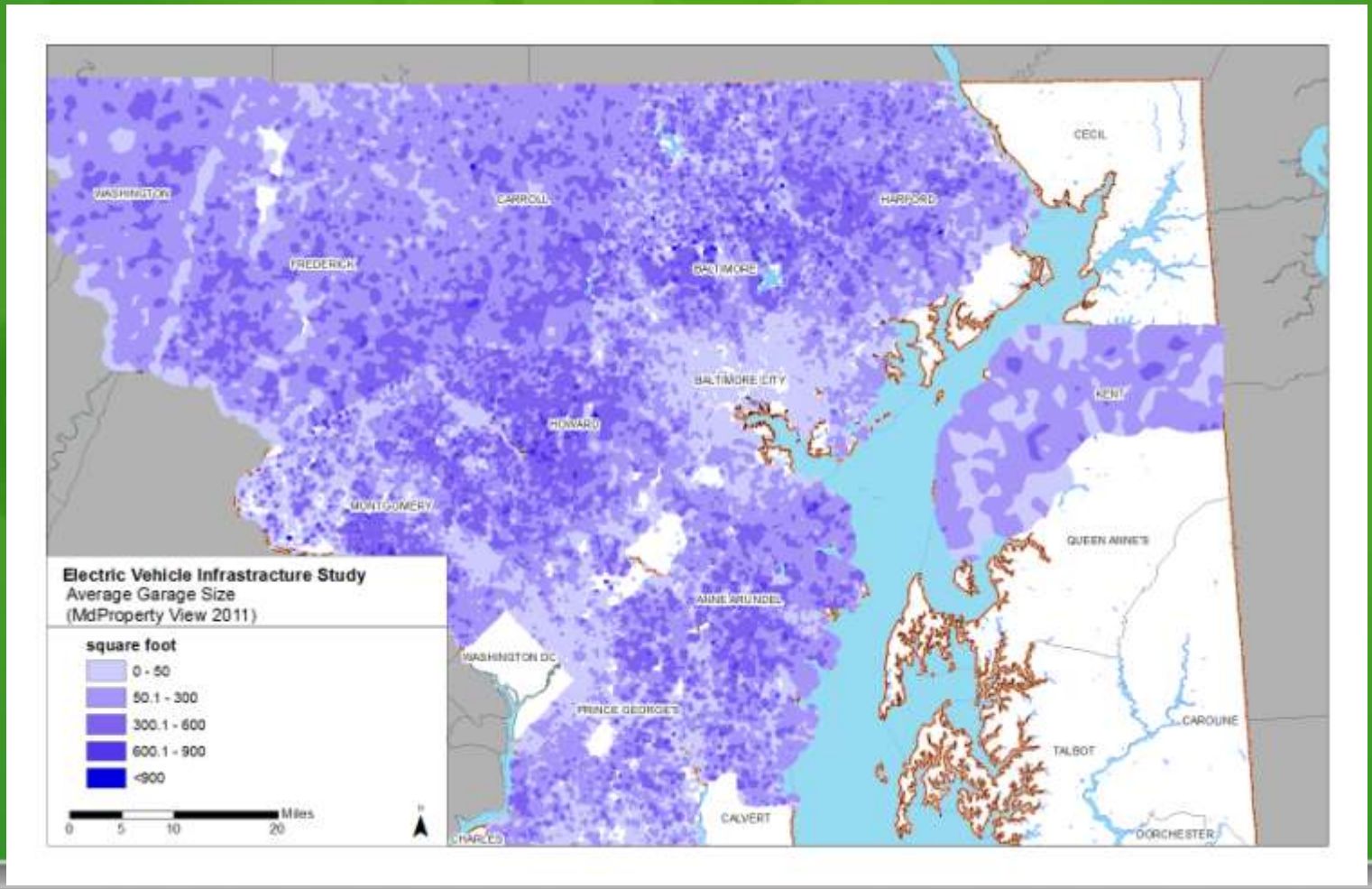
PEV Ownership Demographics – Garage Data

Garage Area (as a proxy for EVSE installation cost)



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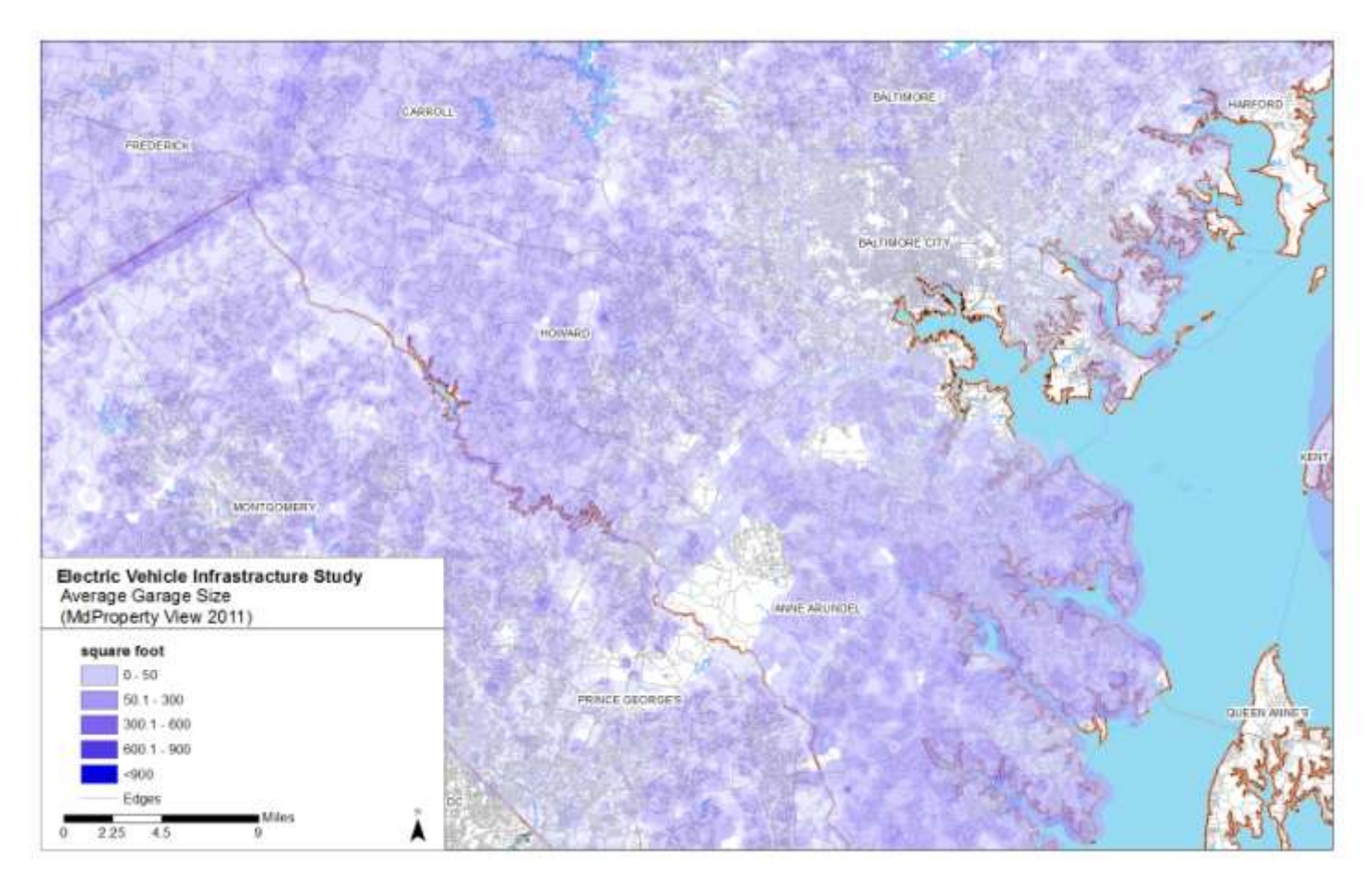

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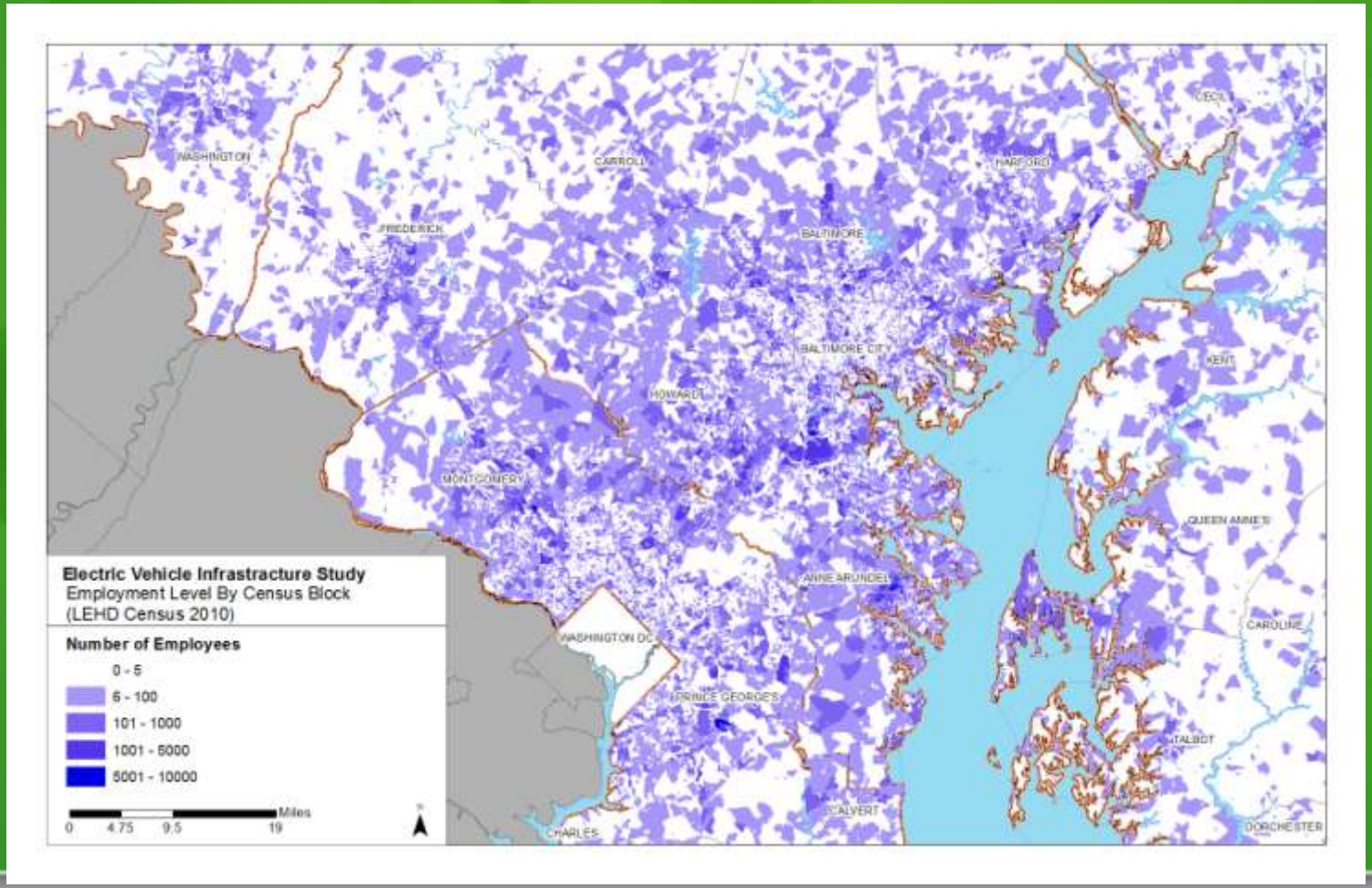
PEV Ownership Demographics – Employment Rate per Block

Estimating work charging with mode choice and commute distance



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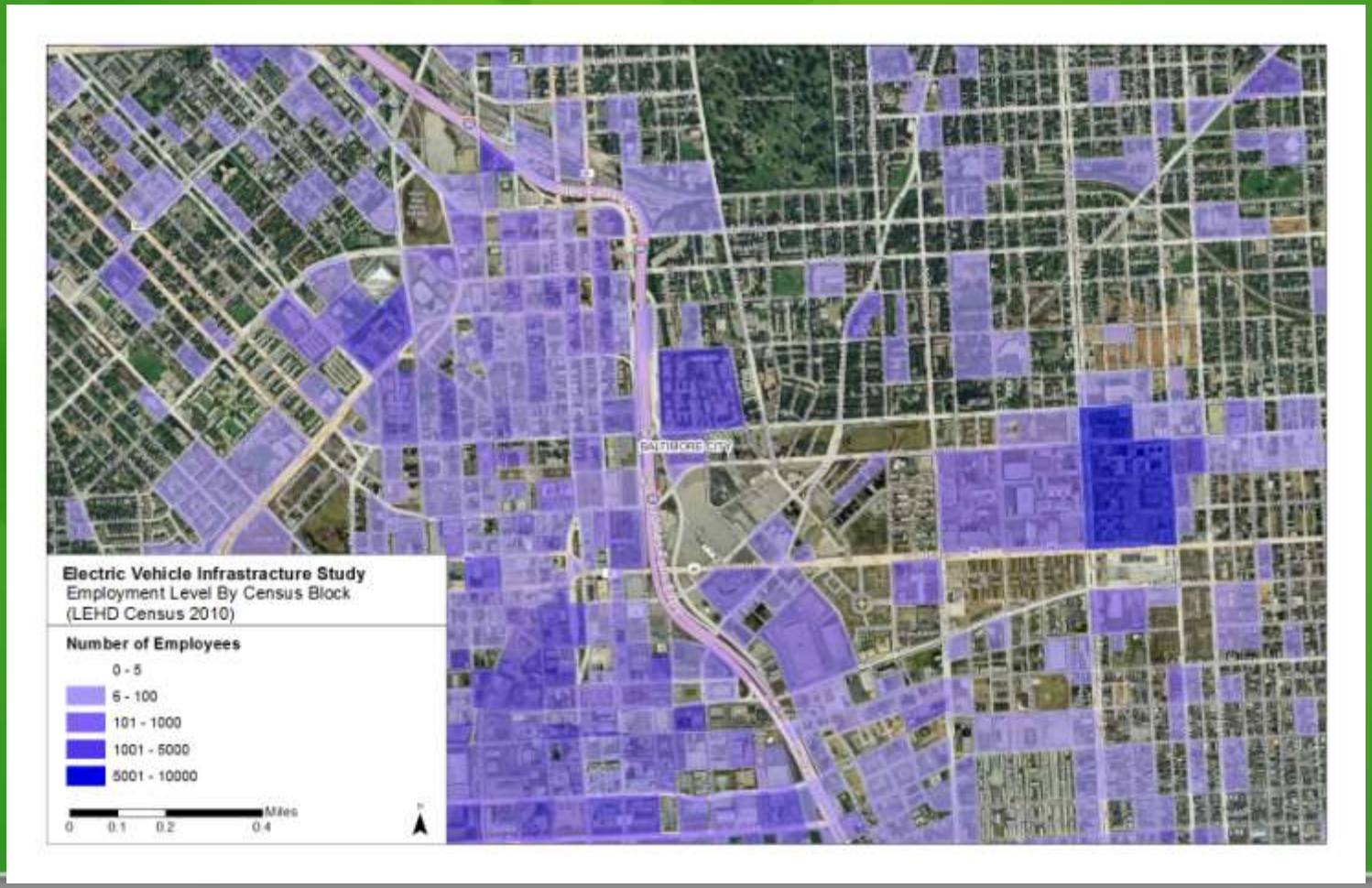

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Preliminary Findings (Draft)

- PEV buyers are new car buyers
- Garage ownership correlates with PEV ownership
- Solar panels and hybrid ownership is highly correlated with EV ownership
- Fleet charging needs may require different charging infrastructure from residentially based customers

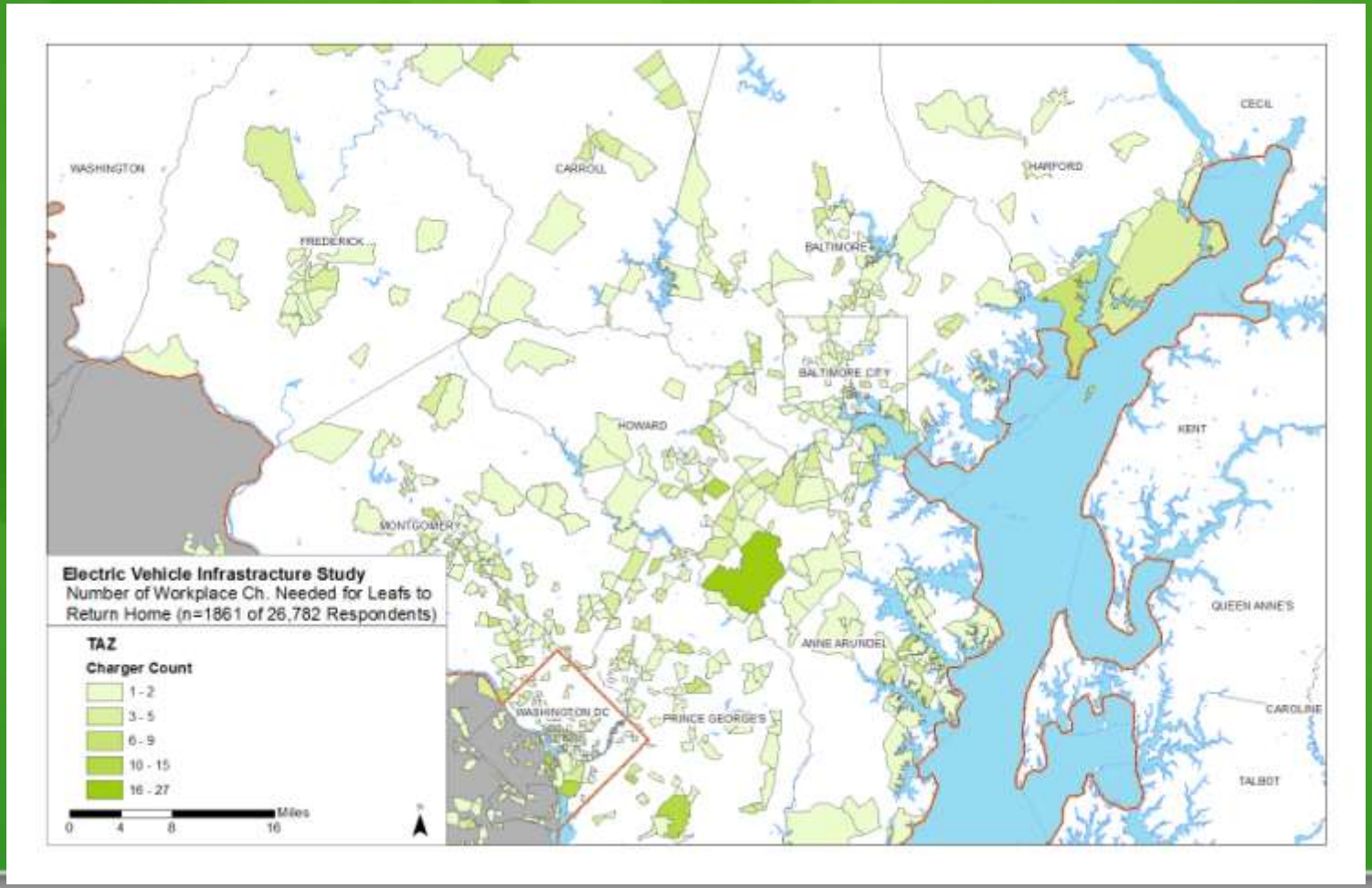
Demand Estimating Methodology

Using the Household Travel Survey to Place Chargers

- 2007 Household survey covers the DC and Baltimore metro regions
- 25,000+ respondents
- Provides linked trips to estimate range needed for daily travel
- Can use charger location scenarios to investigate public charging needs
- Accurately estimates dwell time

Preliminary Findings (Draft)

What if all respondents drove a Leaf to work? Where and how many work chargers?



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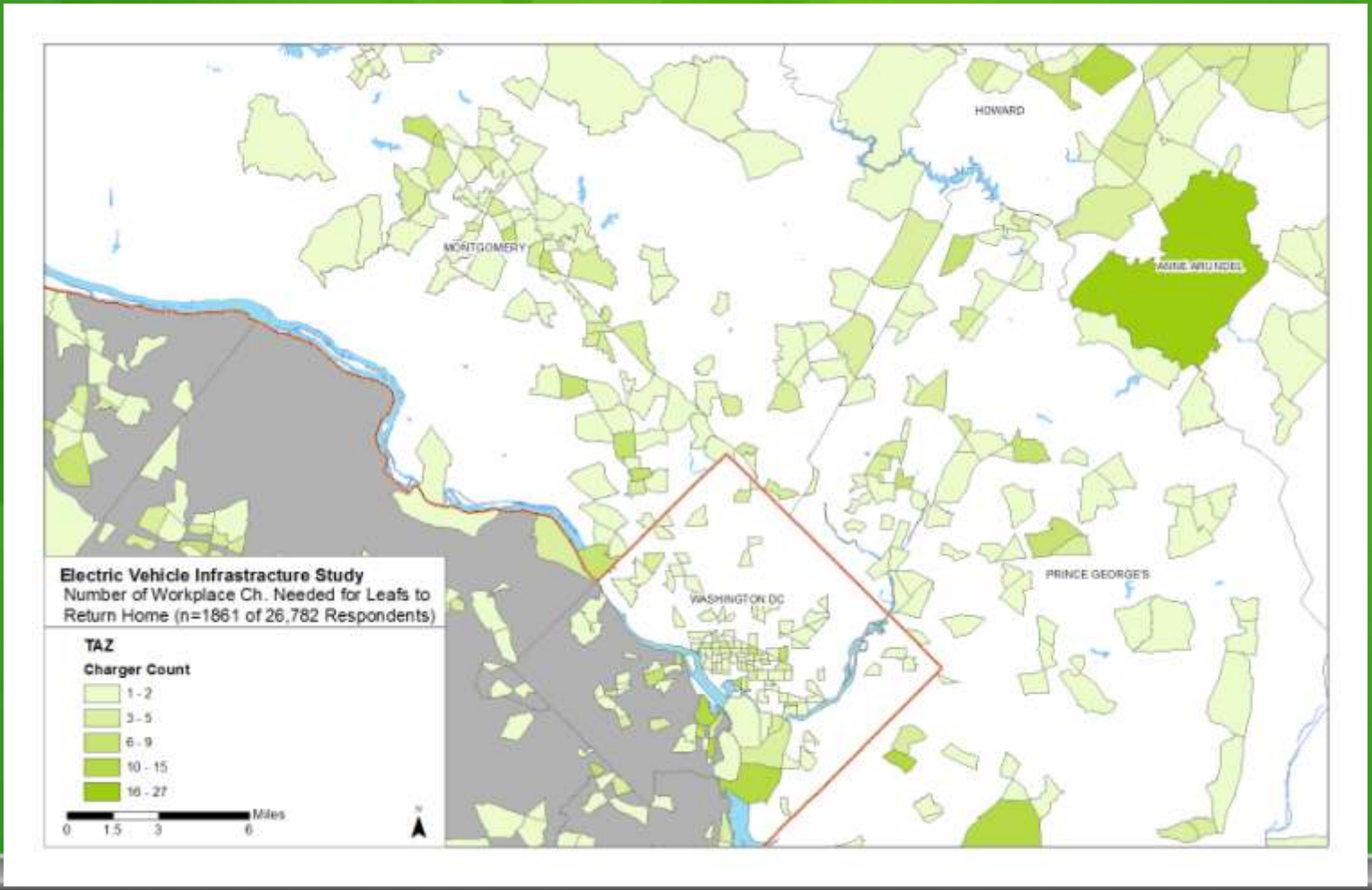
Preliminary Findings (Draft)

Montgomery County



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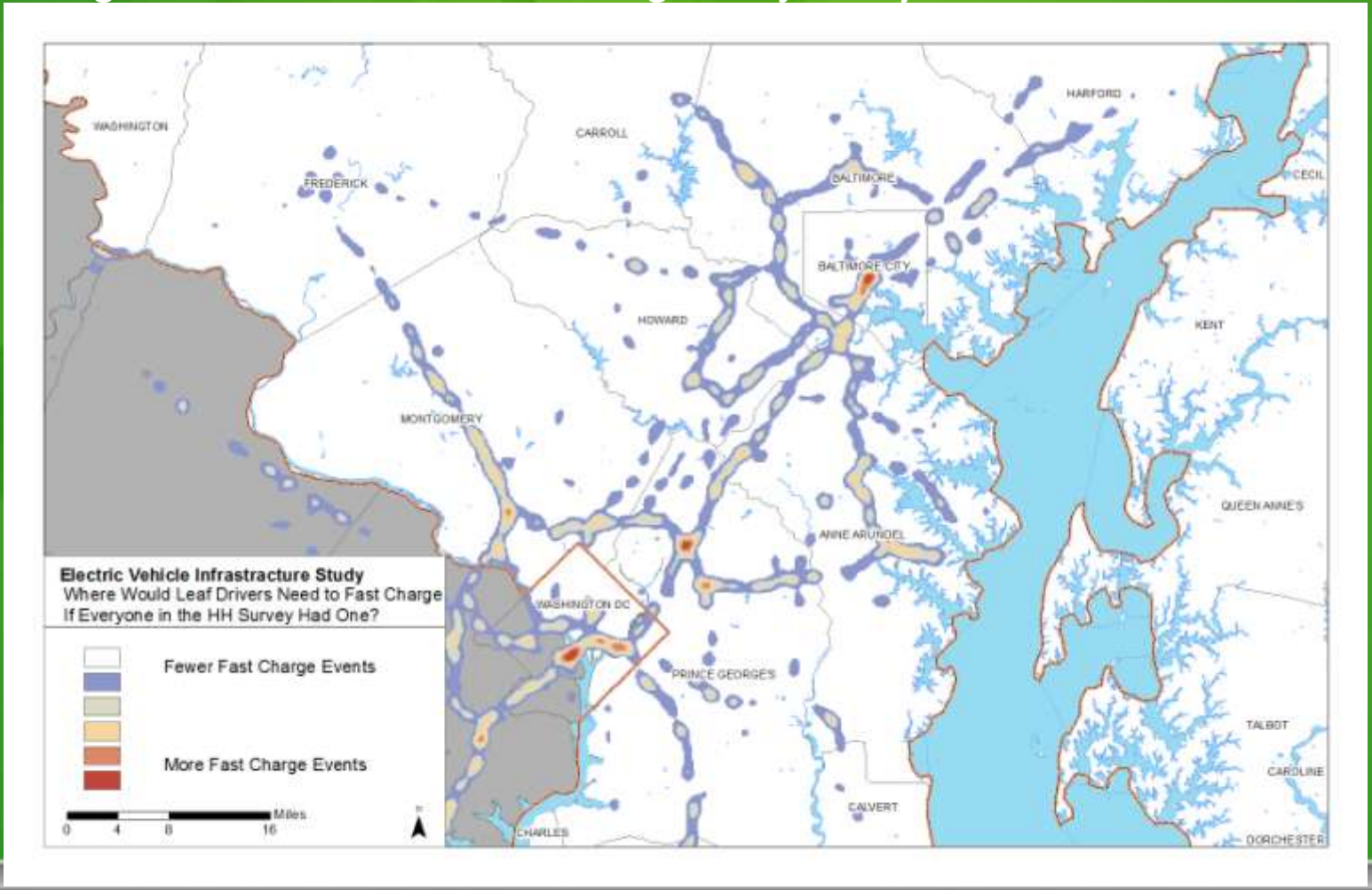
Preliminary Findings (Draft)

Where might Leaf owners run out of charge mid-journey and need DC Fast?



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Coming Up Next

Charger Placement Methodology Going Forward

- Identify likely buyer locations
- Create low, medium and high penetration scenarios
- Use travel model for scenario testing of different charger locations for level 2 and DC fast charging to serve that market
- Estimate potential benefit in terms of electric vehicle miles traveled for different charger scenarios

2012 EVI Timeline

Task	Activity	March	April	May	June	July	August	September
1	Project Management							
2	Support of Electric Vehicle Infrastructure Committee							
2.1	Data Collection							
2.2	Demand Analysis							
2.3	Determination of Charging Station Demand Areas							
2.4	Draft Infrastructure Plan							
2.5	Final Infrastructure Plan							
3	Communications and Outreach							
3.1	Plan Development							

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Next Steps

- Finalize Demand Approach/Findings (May/June)
- Coordinate on Outreach (June/July)
- Develop Strategies to Implement EV Charging Stations – by type & geographic area (June/July)
- Develop EVIC Plan - policies and demand area (July/August)
- Finalize EVIC Plan (August/September)